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AUTHOR Latta, Michael R.
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ABSTRACT

The personal space of strangers who are not attempting to influence each other has been extensively studied using single dependent measures. Multivariate personal space can be defined by three dimensions: relational, locational and interactional, and operaticnalized by the measures previously used singly. The present experiment tested the relation of multivariate personal space defined by shoulder orientation, seating position at or away from an occupied table, and interpersonal distance to psycholcgical stress in the form of status differences among strangers. Results indicate adjustments in the magnitude of multivariate personal space are a function of stranger status level and that these adjustments occur in all three dimensions of multivariate personal space. The complex nature of human social behavior suggests multiple behavioral measures should be used in future research to minimize experimenter bias, maximize generalizability of results, and maximize power in hypothesis testing. (Author)

A Multivariate Analysis of Personal Space

R. Michael Latta

Drake University

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A Multivariate Analysis of Personal Space

The content of environmental psychology has included research dealing with the relation of the physical environment to social behavior. Recent reviews (e.g., Altman, 1976) have indicated over 200 empirical studies concerned with the relation of aspects of the social-physical environment to the social-behavior variable personal space. Specifically, the personal space of strangers who are not attempting to influence each other has been extensively studied.

Regardless of theoretical definitions, personal space has typically been operationally defined by interpersonal distance, or the angle of orientation one person adopts relative to others comprising the social-physical environment. Early research usually employed only one of these operational definitions of personal space and focused on changes in personal space as a function of the gender and age of the subject population under study and the gender and age of the persons comprising the social-physical environment. This previous univariate research has established a relation between magnitude of personal space defined by interpersonal distance and psychological stress in the form of status differences among the persons present. For example, Lott and Sommer (1967), Mehrabian and Friar (1969), and Latta and Kahn (1972) have reported males to place themselves closer to peers than to persons of higher status.

Pedersen and Shears (1973), in rejecting simple univariate definitions of personal space, suggest that personal space is defined by at least three components: a) relational space referring to the orientations of people toward one another,

b) locational space referring to the use of the physical setting, such as chairs and tables, and c) interactional space referring to variables that influence the flow of communication, such as interpersonal distance or eye contact. These components of personal space are assumed to be governed by tendencies to approach or avoid other persons in the social-physical environment. The magnitude of multivariate personal space is assumed to be adjusted by changes in one or more of the three components whenever psychological equilibrium is disturbed by situational factors such as psychological stress.

The present experiment was designed as a multivariate test of the hypothesized relation of personal space to status differences. Three measures of multivariate personal space (shoulder orientation, seating position at or away from an occupied table, and interpersonal distance) were used to determine if psychological stress, in the form of status differences among strangers, leads to an increase in multivariate personal space. Based on previous univariate research (see Pedersen and Shears, 1973 for a review), the three dimensions of multivariate personal space (relational, locational, and interactional) were predicted to vary with a stranger's status level in the following manner. Subjects were expected to maintain: a) maximum multivariate personal space with strangers of higher and lower status, and b) minimum multivariate personal space with strangers of peer status.

Method

Subjects and Design

Participants were 48 male and 48 female general psychology students who participated for extra credit in their course.

Eight males and eight females were randomly assigned to one of six levels of the independent variable target status which was manipulated by the age and gender of the target. Following Sampson (1969), the status level of male targets was assumed higher than female, and older targets higher than younger. The male and female low status targets were nine years old, those of peer status were college age, and those of highest status were fifty years old. Thus target status level was classified from 1 to 6. The targets were equated on general physical attractiveness and two different targets were used at each status level to determine if spacing was specific to an individual target.

Experimental Room

Figure 1 presents a diagram of the room used for this study. The target was reading a book in the position marked "T" in Figure 1. A chair on rollers was just inside the door approximately five feet from the nearest corner of the table, and was the only available seat in the room. There was enough room around the table for six seating positions.

Insert Figure 1 About Here

Procedure

When the subject arrived for the experiment, the experimenter directed him/her to enter the experimental room and pull up a chair at the table while the experimenter obtained the materials for the experiment. All targets were trained to glance, but not smile, at the subject as he/she entered the room and then to

continue reading to avoid interaction. After giving the subject sufficient time to position the chair, the experimenter went to the room and collected the data. Before entering the experimental room, the experimenter unobtrusively recorded the subject's shoulder orientation on a data sheet identical to Figure 1 by drawing a circle representing the spot the subject had placed the chair and then drawing a line through the circle representing the subject's shoulder orientation. The relational space measure was the angle between a line perpendicular to the subject's shoulder orientation and a line to the target constituting line of sight for eye contact from the subject's chosen position. The subject's seating position was scored as 1 if he/she sat at the table with the target and 0 if he/she did not move the chair to the table as instructed. The use of the table constituted the locational space measure. The interactional space measure, interpersonal distance, was obtained by stretching a tape measure between the closest points of the target's and subject's chairs, and was recorded in inches.

Results and Discussion

A summary of the raw data for the three components of multivariate personal space as a function of subject gender and target status level is presented in Table 1.

Insert Table 1 Here

A preliminary 2 X 6 X 2 multivariate analysis of variance (MANOVA) was conducted with the last factor corresponding to the

two different targets used in each cell of the 2 X 6 between factor design. Since the target used in a cell was not found to be a significant source of variation, the data were collapsed and a 2 X 6 MANOVA was computed with an n of eight per cell. The results of this MANOVA with subject gender and target status level as between subjects factors and the body orientation, seating position, and distance measures as correlated dependent measures of multivariate personal space is presented in Table 2.

Insert Table 2 Here

Relation of Status Level to Multivariate Personal Space

Table 2 indicates support for the hypothesized relation of target status level to the magnitude of multivariate personal space. This relation applies to all three components of multivariate personal space as evidenced by a significant main effect for the status level variable in all three univariate analyses of variance. Since the significant main effect of subject gender observed in the MANOVA applied only to the relational component of multivariate personal space, it was considered of minor importance.

A graph of the relation of target status level to the magnitude of multivariate personal space appears in Figure 2. The multivariate personal space values are a linear combination of the three univariate measures of personal space computed by using the eigen values from the MANOVA as weights. Figure 2 illustrates the curvilinear relation of target status level to the magnitude of multivariate personal space and suggests that psychological stress

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Insert Figure 2 Here

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in the form of status differences among strangers expands multivariate personal space as hypothesized. The main effect of subject gender on the magnitude of multivariate personal space is also illustrated in Figure 2 and suggests that females are more sensitive than males to social-physical environmental cues such as the age and gender of other persons.

Conclusions

Summary of Findings

The data reported here suggest that the magnitude of multivariate personal space varies with the gender of the subject and the status level of strangers comprising the social-physical environment. Thus when the subject is under stress because of status differences, the magnitude of multivariate personal space is adjusted by changes in all three components of personal space: relational, locational, and interactional. This adjustment is more pronounced in females than in males, possibly because of greater female sensitivity to the social-physical environment.

Methodological Considerations

The effects of experimenter bias on experimental results (cf., Rosenthal, 1966) favors the use of behavioral measures of personal space as employed in this study. Although the trend is toward employing behavioral measures of personal space (Evans & Howard, 1973), univariate dependent measures would not seem adequate for the study of a complex construct such as personal space. The complex nature of human social behavior suggests employment of a combination of measures designed to minimize bias and maximize generalizability. Studies based on a single dependent

measure, such as interpersonal distance, could easily be improved with the addition of a body orientation measure at little cost in time and effort. In studies where the two dependent measures have both been taken, the experimenters have routinely conducted separate univariate analyses of variance. Analysing the measures separately robs the investigator of power in testing his hypothesis. (See Kerlinger and Pedhazur, 1973, p. 359 for an example of multivariate statistical significance with unusual univariate effects.) The multivariate nature of personal space suggests a multivariate approach in both experimentation and analysis.

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Table 1

Summary of the Raw Scores for the Three Components of Multivariate Personal Space as a Function of Subject Gender and Target Status Level

Subject Gender	Target Status Level	Component of Multivariate Personal Space: Relational-Orientation[a]	Locational-Seating Position[b]	Interactional-Distance[c]
Males	1	55	50.0	99
	2	36	75.0	95
	3	49	100.0	59
	4	97	75.0	72
	5	43	50.0	94
	6	77	12.5	120
Females	1	47	25.0	111
	2	29	75.0	90
	3	23	87.5	63
	4	37	75.0	85
	5	49	37.5	108
	6	53	62.5	88

[a]Reported as mean degrees.

[b]Reported as % of males or females seated at the table in each cell.

[c]Reported as mean inches.

Table 2

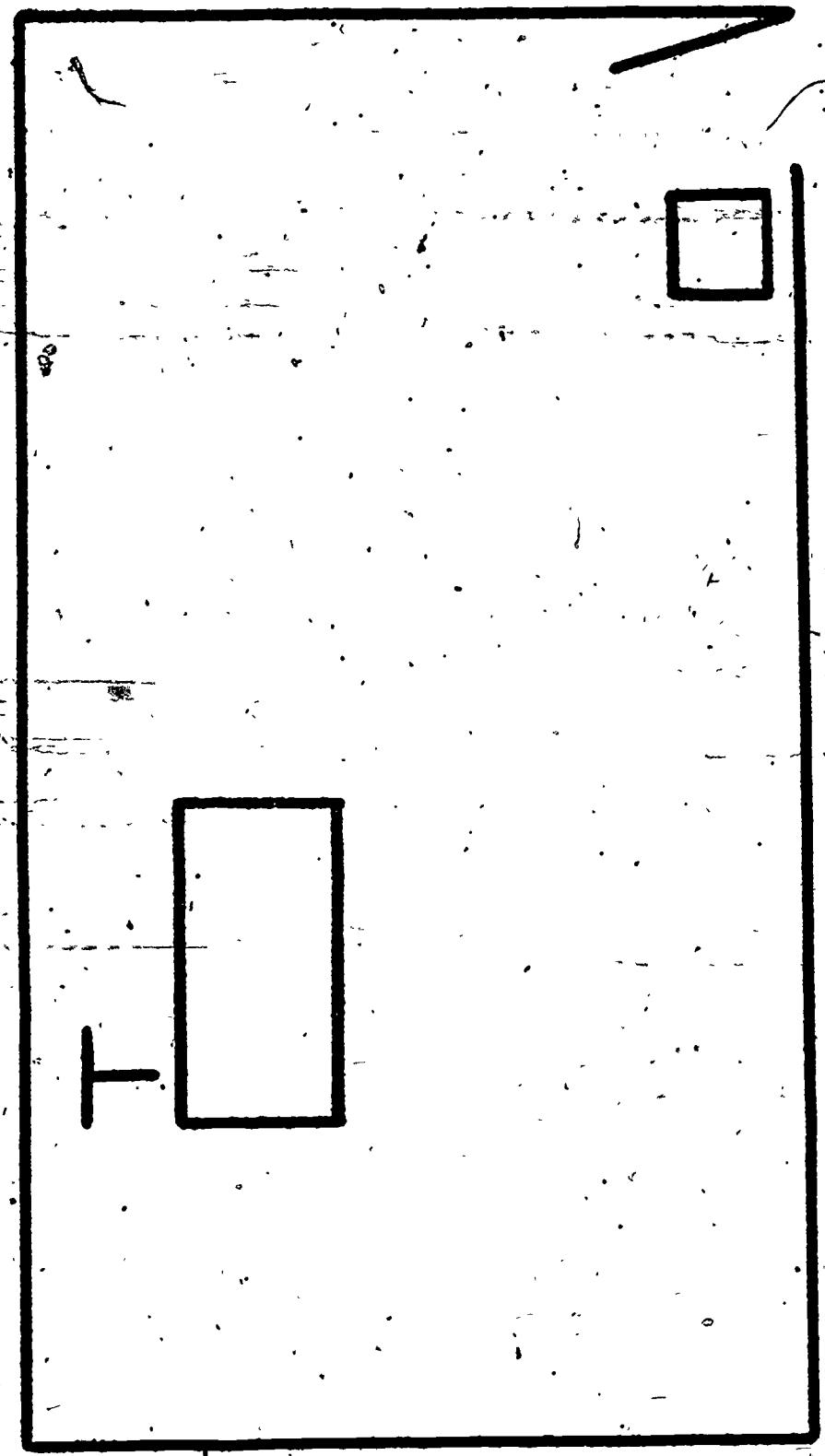
Summary of the MANOVA for Multivariate Personal Space as a Function of Subject Gender and Target Status Level

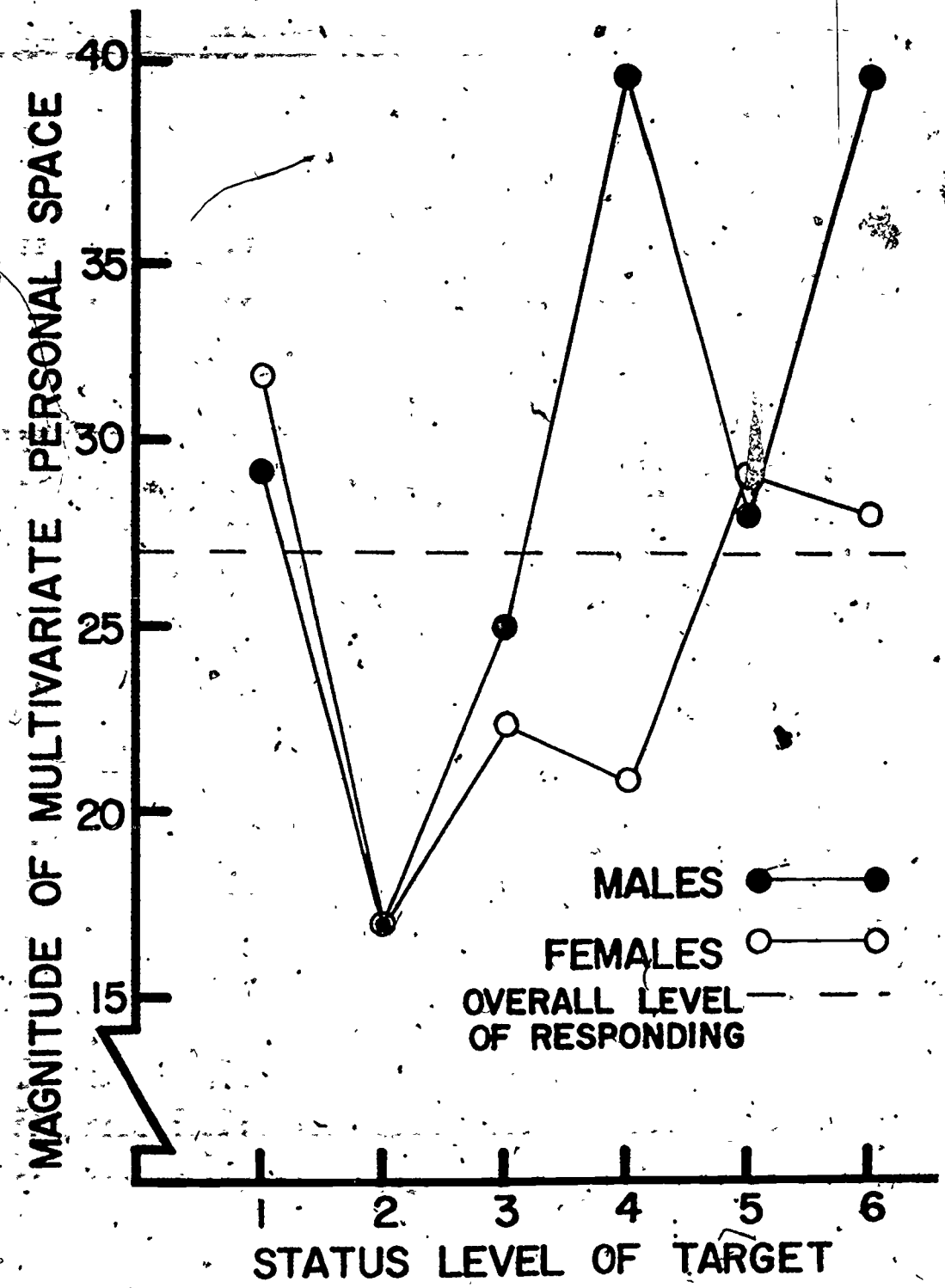
Source	Multivariate F (df_h, df_e)	Variable with Significant F in the ANOVA ($p < .05$)
Subject		
Gender (A)	2.75 (3, 82), $p < .05$	Body Orientation
Target Status Level (B)	3.56 (15, 242); $p < .0001$	Body Orientation, Seating Position, Distance
A X B	1.39 (15, 242), n.s.	None

Figure Captions

Figure 1. Floor Plan for the Experimental Room

Figure 2. Multivariate Personal Space as a Function of Stranger Status and Subject Gender




MAGNITUDE OF MULTIVARIATE PERSONAL SPACE
40
35
30
25
20
15
MALES
FEMALES
OVERALL LEVEL OF RESPONDING
1
2
3
4
5
6
STATUS LEVEL OF TARGET